inDART®-COP8F

In System Programmer for National Semiconductor COP8 FLASH Devices

User's Manual

SofTec® MICROSYSTEMS

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Written by Paolo Xausa

Contents

1. Overview **5**
What is inDART-COP8F? 5
Supported Devices 5
What is In System Programming (ISP)? 5
Software Upgrades 6

2. Getting Started **7**
inDART-COP8F Components 7
Host System Requirements 7
Installing the Hardware 7
Installing the Software 8

3. inDART-COP8F Operations **11**
DataBlaze Overview 11
Device Selection 11
Communication Settings 12
Option Byte Settings 13
Programming 13

4. Troubleshooting **15**
Installing the inDART-COP8F User Interface under Windows NT/2000 15
Common Problems and Solutions 15
Communication can't be established with inDART-COP8F *15*
Getting Technical Support 16

Appendix: Technical Specifications **17**
Electrical and Physical Specifications 17

1. Overview

What is inDART-COP8F?

inDART-COP8F is a powerful entry-level tool for National Semiconductor COP8-based systems. inDART-COP8F takes advantage of SofTec Microsystems DataBlaze programming interface and the ISP (In System Programming) feature to program the FLASH memory of the COP8 family of microcontrollers. inDART-COP8F is connected to the host PC through a parallel port, while the 10-pin probe of the product fits into the target's ISP connector.

inDART-COP8F can be powered by the target application (through the ISP connector) and works from 2.7 to 5.5 V.

inDART-COP8F implements a very fast ISP programming algorithm: an erase/program/verify cycle is performed in less than 15 seconds on a 32K device.

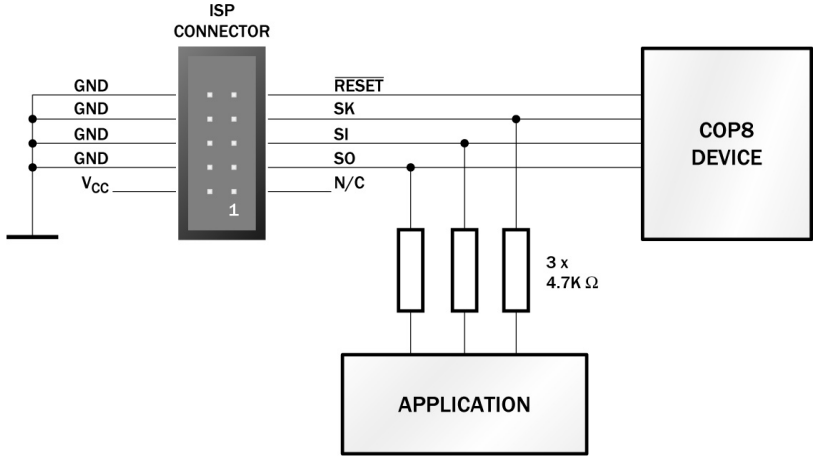
Supported Devices

inDART-COP8F currently supports all COP8 FLASH devices, in all packages. Supported devices are: COP8AME9, COP8ANE9, COP8CBE9, COP8CBR9, COP8CCE9, COP8CCR9, COP8CDE9, COP8CDR9, COP8SBR9, COP8SCR9, COP8SDR9. For the support of newly introduced devices, please consult our website.

What is In System Programming (ISP)?

The ISP feature allows you to update the content of FLASH program memory when the chip is already plugged on the application board. The ISP feature can be implemented with a minimum number of added components and board area impact.

inDART-COP8F uses a 10-pin ISP connector to program the target device. You must therefore provide such connector (see the diagram below) on your target board. The serial ISP routines are implemented over the SI, SO and SK lines of the COP8 MICROWIRE/PLUS interface.



ISP Connections

- **SI:** MICROWIRE/PLUS serial data input
- **SO:** MICROWIRE/PLUS serial data output
- **SK:** MICROWIRE/PLUS serial shift clock
- **RESET:** Device reset
- **GND:** Device power supply ground
- **V_{cc}:** Device power supply voltage

Note: *in order to enter the ISP programming mode under all conditions—in particular when the option bit 0 (FLEX) is set—inDART-COP8F supplies a 2 x V_{CC} voltage to the SI pin. You should be cautious of this high voltage, since it could damage other circuitry connected to the SI pin.*

Software Upgrades

The latest version of the inDART-COP8F system software is always available for free on our website: *http://www.softecmicro.com*.

2. Getting Started

inDART-COP8F Components

The inDART-COP8F package includes the following items:

1. The inDART-COP8F ISP programmer;
2. A 20-cm, 10-conductor ISP cable;
3. The SofTec Microsystems “System Software” CD-ROM.

Host System Requirements

inDART-COP8F is controlled by a PC user interface (DataBlaze for inDART-COP8F) running under Windows. The following hardware and software is required to run the DataBlaze user interface:

- An Intel Pentium 100 or above running Windows 95, Windows 98, Windows Me, Windows 2000 or Windows NT;
- 32 MB of random-access memory (RAM) plus 20 MB of available disk space.

Installing the Hardware

The inDART-COP8F ISP programmer is connected to the host PC through a parallel port. Connection steps are numbered below in the recommended flow order:

1. Turn off the PC;
2. Insert the male D-Sub connector of the parallel cable into a free PC parallel interface (LPT1 or LPT2);
3. Insert the other end of the parallel cable into the LPT connector on the inDART-COP8F board;

4. Insert one end of the ISP cable into the ISP connector on the inDART-COP8F board;
5. Insert the other end of the ISP cable into the ISP connector of your target application;
6. Turn on the PC;
7. Turn on the power to the target application which also powers the inDART-COP8F board.

Note: *inDART-COP8F can be powered by the target application via the ISP cable. In this case, the power supply is taken from the V_{CC} pin of the ISP connector, and MUST BE in the range 5.0-5.5 V, 40 mA. In the case your target application is not able to provide the required voltage and current (e.g. your target works at 2.7 V), you must power the inDART-COP8F board via its power connector. inDART-COP8F uses a 9-12 V DC, 100 mA (unregulated) wall plug-in power supply with a 2.1 mm pin and sleeve plug with positive in the center and sleeve as ground.*

Installing the Software

The DataBlaze user interface (inDART-COP8F-specific) setup program is located on the SofTec Microsystems "System Software" CD-ROM provided with the instrument. The setup program will copy the required files to your hard drive. Additionally, an uninstall program will be copied, giving you the option to uninstall the DataBlaze user interface at any time.

To install the DataBlaze user interface:

1. Insert the **"System Software"** CD-ROM into your computer's CD-ROM drive.
2. A startup window should automatically appear (if the startup window doesn't appear automatically, manually run the "Setup.exe" file located on the CD-ROM root). Choose **"Install Instrument Software"** from the main menu.
3. A list of available applications should appear. Click on the **"Install inDART-COP8F System Software"** option.
4. Follow the on-screen instructions.

Note: *if you are installing the inDART-COP8F system software on Windows NT or 2000, you must have logged in as Administrator.*

3. inDART-COP8F Operations

DataBlaze Overview

DataBlaze is a full-featured, easy-to-use programming utility. It offers:

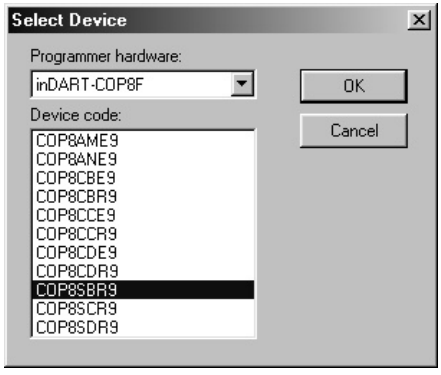
- Code memory editing capabilities;
- Data memory editing capabilities (for devices featuring a data memory area);
- Blank check/erase/read/program/verify operations on Code memory, Data memory and Option Bytes;
- Project handling.

DataBlaze is a common programming environment for all of the inDART series tools. To learn its basic working principles, please refer to the DataBlaze online help (available from within DataBlaze itself).

Each inDART series tool has its own, customized DataBlaze version; the following sections detail specific options targeted to inDART-COP8F.

Device Selection

Before to start a programming, you must define and configure the target device you wish DataBlaze to program. The target device is defined in the *Select Device* dialog box. To access it, select **Operations > Select Device** from the main menu. The following dialog box will appear.

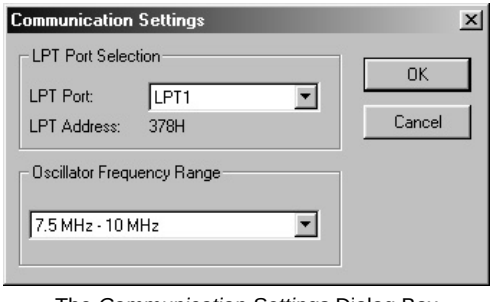


The *Select Device* Dialog Box

- First of all, verify that the inDART model corresponds to "inDART-COP8F".
- The "Device Code" parameter specifies the target microcontroller used in your target application. You must specify the exact device code of the microcontroller you are working with.

Communication Settings

inDART-COP8F communicates with the host PC through a parallel interface. You must therefore specify the LPT port inDART-COP8F is attached to. Additionally, DataBlaze must know the clock frequency the target microcontroller is working at. To specify these parameters, open the *Communication Settings* dialog box, by choosing **Operations > Communication Settings**. The following dialog box will appear:

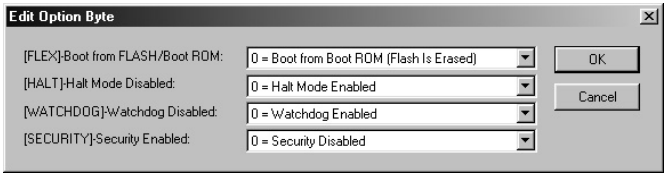


The *Communication Settings* Dialog Box

- Select the appropriate LPT port number for the **LPT Port** parameter;
- Select the **Oscillator Frequency Range** which includes the frequency value of the microcontroller to be programmed.

Option Byte Settings

The *Edit Option Byte* dialog box allows you to configure the device option byte. To open the *Edit Option Byte* dialog box, choose **Edit > Option Byte** from the main menu.



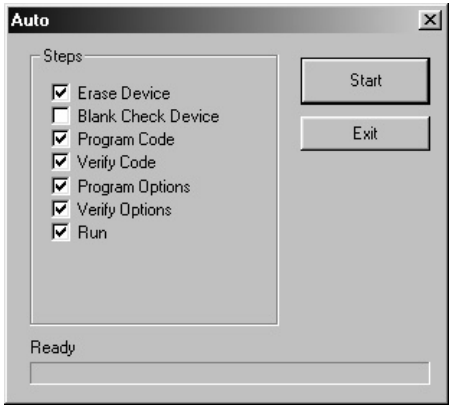
The *Edit Option Byte* Dialog Box

- **FLEX (Boot from FLASH/Boot ROM).** Indicates whether execution following RESET will be from FLASH memory or from Boot ROM. In the latter case, FLASH memory is erased. Execution from Boot ROM is usually needed to implement ISP programming routines. However, since inDART-COP8F can always enter the ISP programming mode, this bit can be safely left to 1 (unless execution from Boot ROM is needed for user purposes).
- **HALT (Halt Mode Disabled).** Enables/disables the HALT mode.
- **WATCHDOG (Watchdog Disabled).** If set to 0, the G1 pin is set to Watchdog output with weak pull-up. If set to 1, the G1 pin is a general purpose I/O pin.
- **SECURITY (Security Enabled).** If set to 0, FLASH memory read and write operations are allowed. If set to 1, FLASH memory read and write operations are not allowed (mass erase is allowed).

Programming

A typical programming procedure is made of a series of programming steps, as indicated in the figure below. You can choose whether to perform or not each

single step. Please note that the programming steps are performed in the exact order indicated in the *Program* dialog box.



The *Program* Dialog Box

- **Erase Device.** Erases the entire Code memory area.
- **Blank Check Device.** Verifies that the device has been correctly erased.
- **Program Code.** Writes the application code into the Code memory area.
- **Verify Code.** Verifies that the application code has been correctly written into the Code memory.
- **Program Options.** Programs the Option Byte according to the parameters specified in the *Edit Option Bytes* dialog box.
- **Verify Options.** Verifies that the option byte has been correctly programmed.
- **Run.** After programming, resets the microcontroller and executes the application program.

4. Troubleshooting

Installing the inDART-COP8F User Interface under Windows NT/2000

In order to install the inDART-COP8F user interface under Windows NT or 2000, you must have logged in as *Administrator*.

Common Problems and Solutions

Communication can't be established with inDART-COP8F

1. Make sure the inDART-COP8F ISP programmer is powered on. inDART-COP8F is powered by the target application via the ISP cable.
2. Make sure that the parallel cable is connected. Also make sure you selected the LPT port number to which the instrument is connected to. To view/change the LPT port in use, choose **Operations > Communication Settings** from the DataBlaze main menu.
3. Make sure you are working with the correct inDART hardware model. To view/change the inDART hardware model in use, choose **Operations > Select Device** from the DataBlaze main menu.
4. Make sure you specified the correct target microcontroller. To view/change the target microcontroller to be programmed, choose **Operations > Select Device** from the DataBlaze main menu.
5. Make sure you specified the correct frequency range for your target microcontroller. To view/change the frequency range choose **Operations > Communication Settings** from the DataBlaze main menu.
6. Make sure the target application board is powered on and the target microcontroller is working. Programming relies on an MICROWIRE/PLUS serial communication between the inDART-COP8F board and the target application. This means that, in order to work correctly, the target microcontroller must be running. In particular, make sure that:
   - The ISP cable is connected to the target application's ISP connector.
   - The target microcontroller is in place.

- All of the ISP connector signals (SI, SO, SK, RESET, V_{CC}, GND) are correctly tied to the target microcontroller.
- The oscillator circuitry is working.

Getting Technical Support

Technical assistance is provided free to all customers. For technical assistance, documentation and information about products and services, please refer to your local SofTec Microsystems partner.

To benefit the free technical support service, the Registration Card must have been filled out and sent in.

SofTec Microsystems offers its customers a free technical support service at *support@softecmicro.com*. Before to get in contact with us we suggest you, however, to visit our online FAQ section on our web site and to be sure you are working with the latest version of the inDART-COP8F system software (online upgrades are available for free at *http://www.softecmicro.com*).

Appendix: Technical Specifications

Electrical and Physical Specifications

Operating Voltage (Self-Powered Mode)	5.0÷5.5 V DC
Operating Voltage (Ext. Powered Mode)	2.7÷5.5 V DC
External Power Supply Range	9÷12 V DC
Power Consumption	40 mA
ISP Cable Length	20 cm
Dimensions	75 x 53 x 17 mm
Weight	35 g (without cables)
Operating Temperature	-5 °C to 50 °C
Storage Temperature	-20 °C to 70 °C
Humidity	90% (without condensation)

Electrical and Physical Specifications

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